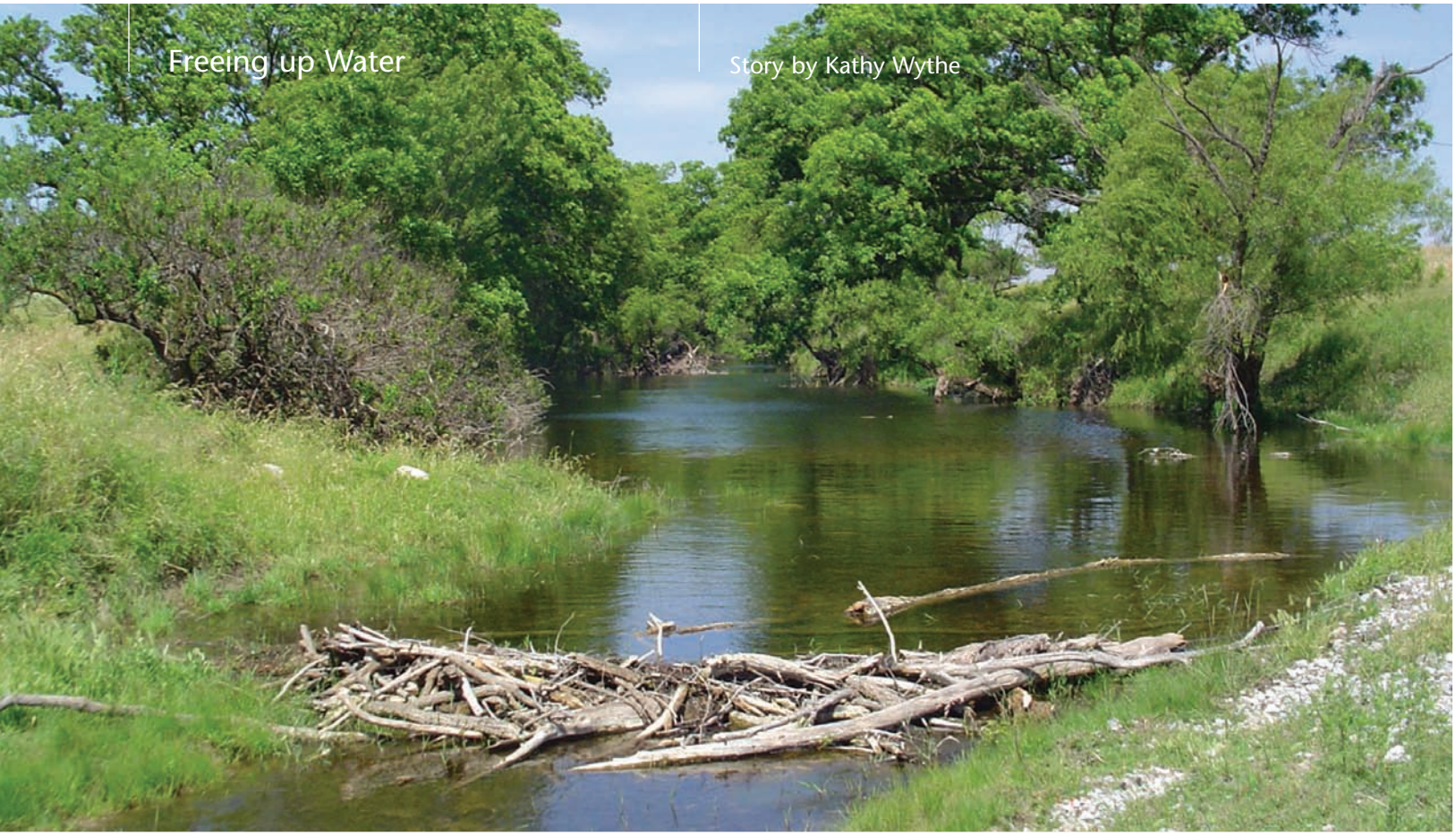
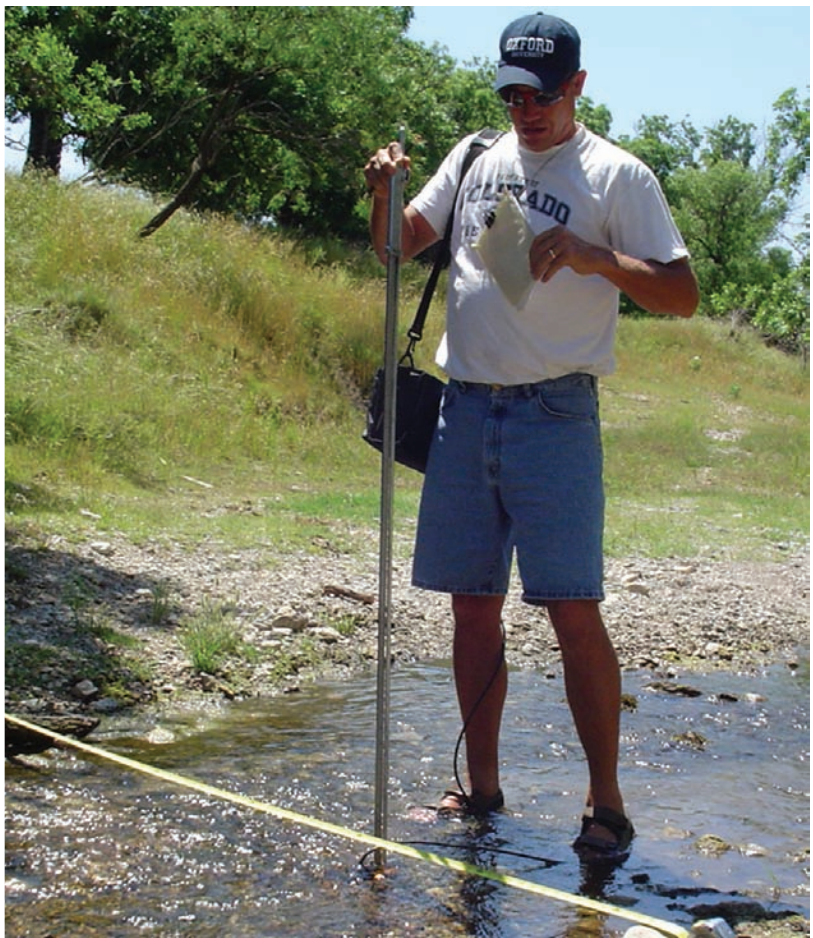
Story by Kathy Wythe



Freeing up Water

Brush control efforts yield water



For 10 years during the 1990s drought, H. R. Wardlaw, a West Texas rancher, watched and waited.

He watched as the Middle Concho River and Rocky Creek running through his ranch near San Angelo became dry. He watched as the Florida bass from East Texas he stocked in the river and 75- to 100-year-old pecan trees lining the banks of the river died. And, he waited for the water to return.

In 2003, he stopped waiting and began participating in the North Concho River Pilot Brush Control Project and the Twin Buttes Brush Control Project. The projects are part of the Texas Brush Control Program, administered by the Texas State Soil and Water Conservation Board and designed to increase water yield by removing or controlling water-consuming plants such as mesquite, cedar and saltcedar.

In 2004, just as he finished excavating cedar, aerially spraying mesquite and hand spraying the remaining mesquite and cedar on his land on the Twin Buttes watershed, it started raining.

"The Middle Concho River and Rocky Creek started flowing again," Wardlaw recalled. "It was almost instantaneous recharge. It overcame 10 years of extreme drought in just that one year, which amazed everybody."

Wardlaw said even though the last year has been short on rainfall, the Middle Concho and Rocky Creek are still running.

"Even without the normal rain in the fall and winter, the Middle Concho River continued to flow great, and Rocky Creek continued to flow straight through the winter with no rain whatsoever," he said. "It absolutely wouldn't have continued over a dry winter and dry spring without brush control work, I am absolutely convinced."

Top photo: The Upper Colorado River Authority observed the return of perennial flow to 40 miles of Sterling Creek (top), the East Fork of Grape Creek and the North Concho River in 2005, flows that did not exist in 2000 before brush control.

Left bottom: H. R. Wardlaw, a rancher near San Angelo, has seen the streams on his land restored after he participated in the Texas Brush Control Program.

Right bottom: Chuck Brown, staff hydrologist for the Upper Colorado River Authority, measures flow in Sterling Creek after brush control.

Historically, the North Concho River and many of its tributaries flowed year round. But, since the early 1960s, the North Concho had been virtually dry and water flow into O. C. Fisher Reservoir was reduced to less than 20 percent of its normal amount, according to a study conducted by the Upper Colorado River Authority (UCRA).

The Texas Legislature authorized the State Board's brush control program in 1985, and funded the first project, North Concho River Pilot Brush Control Project, in 1999.

The State Board chose the North Concho River as the first watershed for the program because a feasibility study published by the UCRA showed that brush control could increase water flows from the river to O. C. Fisher Reservoir, a water supply source for San Angelo.

The voluntary program includes cost-share assistance for the "selective control, removal or reduction of noxious brush such as mesquite, saltcedar or other brush species that consume water to a degree that is detrimental to water conservation," according to the State Board's Web site. The program currently has three completed and 10 ongoing projects.

Working with the local soil and water conservation district's staff, landowners develop individual resource management plans that address brush control and other natural resources issues such as soil erosion, water quality and wildlife habitat. They then receive financial assistance (up to 70 percent of the costs) to clear their land of the water-consuming brush by physically removing it with bulldozers or excavators, by aerially spraying the land with herbicides or, in some cases, controlled burning. To date, landowners have treated 554,000 acres mechanically and 65,000 acres by aerial spray through the Texas Brush Control Program.

The principle is that by removing the brush, more water is left to seep into the groundwater or flow into the streams, rivers and lakes. The land also reverts to grassland.

Jimmy Powell, a West Texas rancher for 60 years, has photos of his land in the early 1900s. "There was no brush except live oak," said Powell, who began participating in the State Board's brush control program in 2002. Through the years, mesquite and cedar took over the land.

Powell, who owns land in Tom Green, Sutton, Schleicher and Menard counties, has treated 22,000 acres of his land in the Pecan Creek and South Concho River watersheds, by mechanically removing the cedar and aerially spraying the mesquite.

"I had not seen Pecan Creek run in 25 to 30 years," he said. "After removing the brush, the springs almost immediately began flowing. Pecan Creek is still flowing."

The North Concho pilot project finished with more than 300,000 acres treated and 314 landowners participating, according to Johnny Oswald, manager of the brush control program.

"We believe brush control works," Oswald said.

He cited a 2006 report by UCRA that said approximately 40 miles of the North Concho River and two tributaries, Sterling Creek and the East Fork of Grape Creek, that had brush removed had perennial flow in 2005. The report also indicated that treatment of 18,270 acres on the East Fork of Grape Creek yielded almost 1,900 acre-feet of water while the adjacent, similar-sized West Fork of the creek with no brush control remained dry.

Regional groundwater levels have risen by 3 feet, on average, since the State Board and landowners initiated brush control in the North Concho watershed, the report said.

Oswald said since the North Concho River project was a pilot project, the State Board made adaptations to the program as it went along.

One of the biggest changes, Oswald said, is targeting smaller sub-basins based on feasibility studies showing a strong potential for high water yield, cost effectiveness and landowner participation.

"Not every watershed and, within the watershed, not every area will be a good candidate for brush control," Oswald said. "Since landowners pay for their own economic benefit, we have to implement it (the program) in a way that landowners will participate. If we don't have landowner participation, we don't have a program."

Brush control for water savings is being implemented in other areas of Texas.

As part of the Pecos River Ecosystem Project, herbicide spraying to control saltcedar, an invasive water-thirsty plant, along the Pecos River began in 1999. For the project's first seven years, total water salvage estimates are between 17.7 to 26.5 billion gallons, according to Dr. Charles Hart, Extension range specialist.

Researchers have identified brush control, primarily Ashe juniper removal, as a method to increase Edwards Aquifer recharge. In January 2006, the Edwards Aquifer Authority and USDA-Natural Resources Conservation Service signed an agreement to offer cost-share to landowners in the Edwards Aquifer region to do brush control.

Johnny Oswald, the Texas State Soil and Water Conservation Board's Brush Control Program coordinator, and Tuffy Wood, program specialist, have worked with West Texas rancher James Powell (center) in clearing brush from his land as part of the Texas Brush Control Program.

While ranchers Wardlaw and Powell provide personal evidence of water savings gained by using brush control, Texas A&M University researchers have studied what watershed elements are necessary to get water savings through brush control for several years.

Dr. Richard Conner, an Agricultural Economics Department professor, has studied brush control from an economics and landowner participation standpoint. From his research, he said that usually 60 to 80 percent of landowners with 50 or more acres are willing to participate in the cost-share program. Using research conducted by NRCS for the feasibility studies of the Hondo, Medina, Sabinal and Perdernales Rivers and Seco Creek watersheds, which concluded additional water could be produced with brush control, Connor also analyzed the cost of the brush control to determine the costs to the state of $16.41 to $42 per acre-foot of additional water.

Connor said brush control can be an economical way to yield water. "If the brush control will yield additional water, and if the brush control is not too costly, and the additional water can be captured and held for use, then $16.41 to $42 is a competitive cost for additional water compared to other alternatives such as new lakes or de-salting of sea water," he said.

According to a 2005 Texas Agricultural Experiment Station research report, the relationship between brush removal and increased water yields becomes stronger as annual rainfall increases and when brush is removed from land adjacent to streams rather than in areas away from the streams.

The report's authors said the linkage between brush removal and increased water yield in upland areas (land away from the surface water) is stronger in areas where water can move rapidly through the soil or in areas where springs currently exist or historically have existed. They also concluded that the highest probabilities of water yield increases are likely for riparian areas where herbaceous plants would replace woody plants such as saltcedar and in areas where groundwater recharge is naturally rapid and high.

In areas with little subsurface water movement and where shrubs are not accessing groundwater, brush control is less likely to increase recharge or stream flow, except where direct runoff is increased.

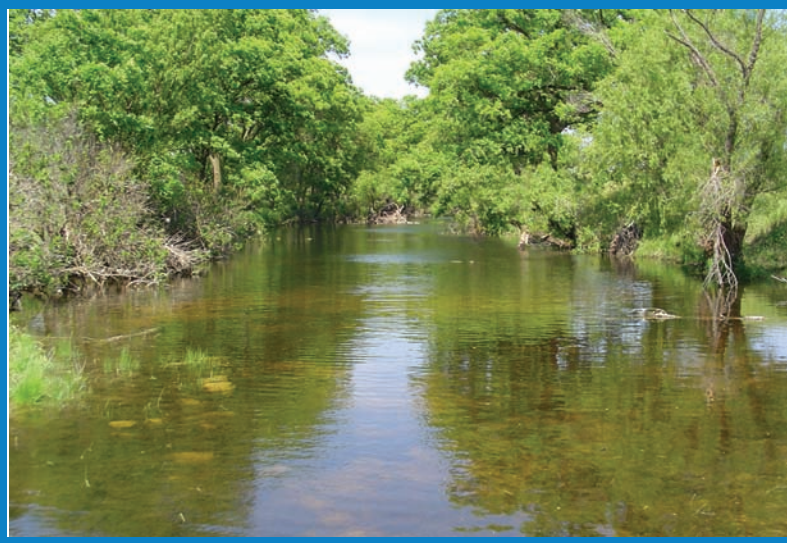
The authors said that well-designed monitoring studies are needed in conjunction with the brush control program, and that brush control should be broadened to include "best management practices for watershed health and sustainability" rather than a simple focus on water yield.

Texas Agricultural Experiment Station researchers Brad Wilcox, William Dugas, Keith Owens, Darrell Ueckert, and Extension specialist Charles Hart were authors of this report.

The 2005 Experiment report may be read at: http://twri.tamu.edu/reports/2005/TAESResearchReport_Shrub.pdf.

A summary of the report is available at: http://twri.tamu.edu/reports/2005/TAESResearchReport_ShrubWater.pdf.

For a report on past brush control projects, read the "Texas Water Resources" article, December 2001, at: http://twri.tamu.edu/newsletters/TexasWaterResources/twr-v26n3.pdf.



The Texas State Soil and Water Conservation Board incorporated lessons learned from a pilot brush control project in the North Concho River Basin into subsequent projects.